New Species of Trichoptera

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During the past several years new species of caddis flies have been collected in western United States. Six of these have been selected for description here. Distributional records of several inadequately known species are given. The hitherto unknown immature stages of two species of *Farula* are included. Unless indicated otherwise, types of the new species are in the author's collection.

GLOSSOSOMATIDAE

Glossosoma sequoia Denning, new species

This species belongs to the *alascense-oregonense* section of the Ripaeglossa line and is closely related to *C. merica* Denn. Distinguishing characters are the eighth sternite tubercle, the cerci, claspers and aedeagus shield. The coiled thoracic process, which occurs in the males of some species of Glossosoma, also contains characters of diagnostic value.

MALE.—Length 8.5 mm. Wings fuscus, except for pterostigma, quite glabrous; head, thorax light brown. The spiral bulbous portion of the prealar coiled thoracic process dark brown. Genitalia as in Fig. 1. Fifth sternite (Fig. 1A) with narrow auriculate-like lobes. Seventh sternum with prominent spatulate dark brown process. Eighth sternum tubercle short, subacute, blackish (Fig. 1B). Tenth tergite completely covered by typical hood-like ninth segment. Cercus and tenth tergite consist of pair of lobes separated on meson by a membraneous sheath; cercus divided into ventrad digitate lobe and dorsad wide, truncate lobe; mesal lobe (tenth tergite) darkened distally, irregularly dentated (Fig. 1C). Claspers short, subtriangular, ventral margin straight, apex acute, dorsal margin dark bearing minute setae. Aedeagus shield arcuate, ventral process massive and joined to base of clasper, about midway to apex it becomes bifid and tapers to an acute ventrad curved apex; from ventral aspect (Fig. 1D) apices acute, convergent. Membraneous aedeagus bearing internal pair of minute sclerotized processes, best seen from ventral aspect (Fig. 1D).

Holotype male, LODGEPOLE, SEQUOIA NATIONAL PARK, CALIFORNIA, 6,800 feet, 27 August 1969, black light, R. G. and M. C. Malin. Deposited in the Entomology Collection, University of California, Riverside, California.

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PSYCHOMYIIDAE

Tinodes gabriella Denning, new species

Members of the genus are cosmopolitan, widespread, and occasionally abundant. This new species represents the tenth North American species. All known species are found only in the western states and adjoining Mexico. This species may be distinguished from other *Tinodes* by the lateral or the ventral aspect of the claspers, by the mesal prong of the clasper, and by the aedeagal sheath. *Tinodes gabriella* is related to *T. provo* Ross.

MALE.—Length 8.5 mm. Wings fuscus, head and thorax darker, appendages similar. Spurs 2-4-4, same color as legs. Genitalia as in Fig. 2. Ninth sternum trianguloid, largely covered by eighth sternum, dorsal corner connected to aedeagal sheath. Apex of ninth tergum terminated in membraneous sheath. Cerci fusiform, extending caudad beyond remainder of genitalia. Clasper basal segment somewhat rectangular, ventral margin slightly shorter than dorsal; from ventral aspect (Fig. 2A) apices blunt, short acute spine present along mesal margin near apex; apical segment with dorsal and ventral margins almost parallel, apex obtuse; from ventral aspect, apices convergent. Mesal blade of clasper curved ventrocaudad, apex truncate, pair of prominent acute spines, subequal in size at base (Fig. 2). Aedeagus encased in a long, slender tubular sheath, curved ventrad and armed with prominent spines (Fig. 2B); aedeagus elongate, apex acuminate (Fig. 2C).

Holotype male, GRAVEYARD CANYON, EAST FORK, SAN GABRIEL RIVER, LOS ANGELES COUNTY, CALIFORNIA, 9 May 1970, J. A. Honey. Type will be deposited in the Entomology Collection, Los Angeles County Museum of Natural History, Los Angeles, California.

Because the distribution of *Tinodes* species is poorly known, the following distributional records are given.

TINODES CONSUETA McLachlan

This ubiquitous species in California is often present in abundance. It is here recorded from Gold Beach, Oregon, 30 June 1967, Kenneth Goeden, and Medford, Oregon, 1 July 1966, L. G. Gentner.

TINODES PROVO Ross and Merkley

The species occurs in Utah, Arizona and California. It is here recorded from Gooding County, Idaho, 10 April, R. L. Newell. In the Aqua Caliente Indian Reservation, Riverside County, California, P. H. Arnaud collected several males and females on 24 and 25 February 1970. At 5000 feet elevation, T. W. Fisher collected a male in Inyo County, California on 9 March 1966; it probably also occurs in Nevada.

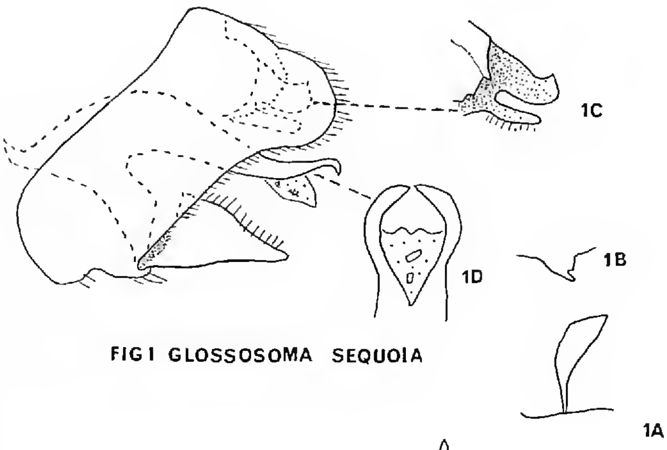


FIG I GLOSSOSOMA SEQUOIA

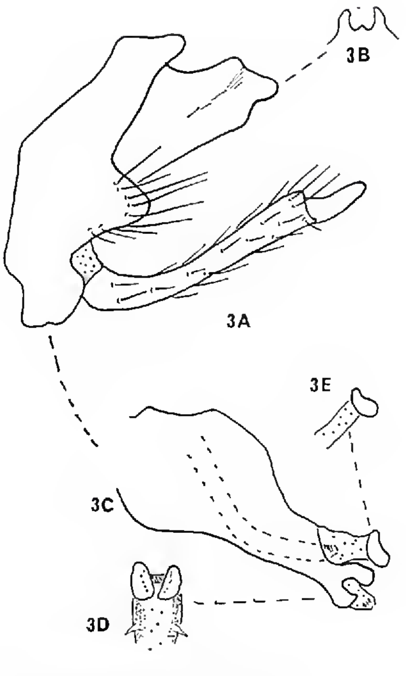


FIG 3 HYDROPSYCHE CORA

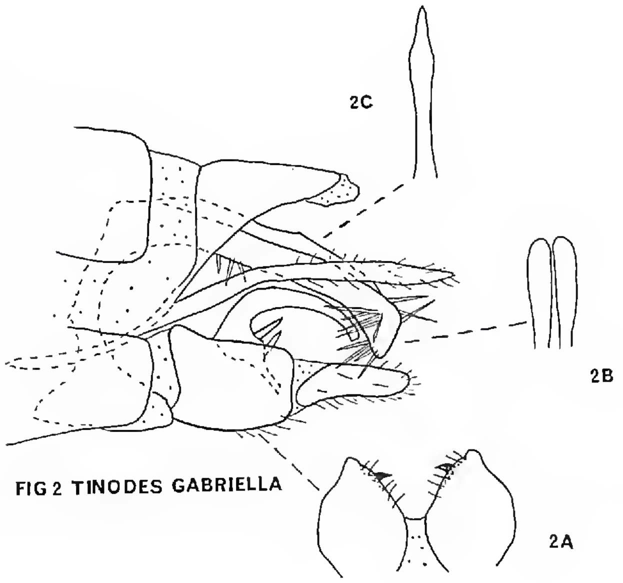
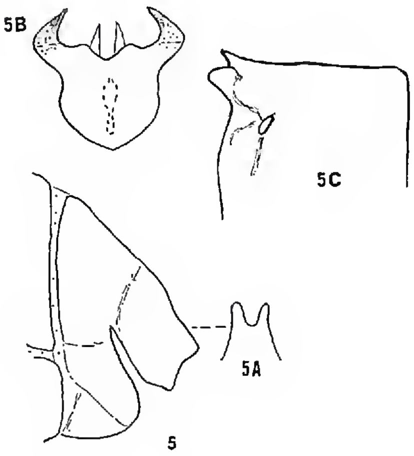


FIG 2 TINODES GABRIELLA



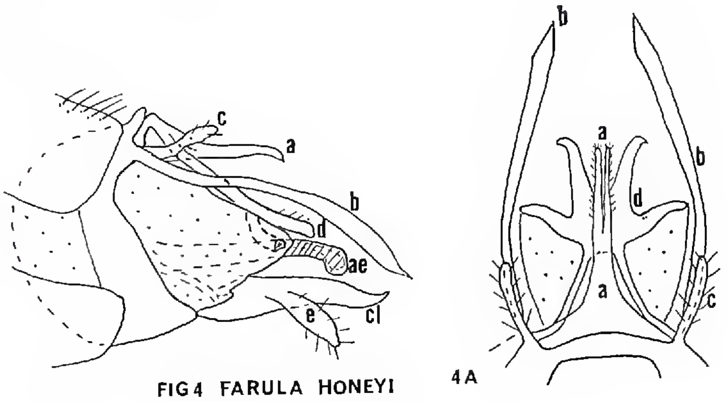


FIG 4 FARULA HONEYI

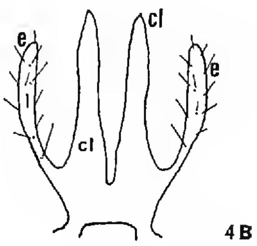


Fig. 1. *Glossosoma sequoia* Denning, male genitalia, lateral view. 1A, fifth sternite lobe, lateral view. 1B, eighth sternite tubercle. 1C, cercus and tenth tergite, lateral view. 1D, aedeagus apex, ventral view. Fig. 2. *Tinodes gabriella* Denning, male genitalia, lateral view. 2A, apices of basal segment of clasper, ventral view. 2B, aedeagus sheath, ventral view. 2C, aedeagus apex. Fig. 3. *Hydropsyche cora* Denning, male genitalia. 3A, lateral view of male genitalia. 3B, tenth tergite apex, dorsal view. 3C, aedeagus lateral view. 3D, apex of aedeagus, dorsal view. 3E, dorsal ovoid plate, lateral view. Fig. 4. *Farula honeyi* Denning, male genitalia, lateral view. 4A, male genitalia, dorsal view. 4B, claspers, ventral view. Fig. 5. *Farula honeyi* Denning, female genitalia, 5A, apex eleventh tergite, dorsal view. 5B, spermatheca ventral view, 5C, fifth sternite, lateral aspect.

TINODES SIGODANA Ross and Merkley

To date collections are available only from Los Angeles County, California. It has recently been collected from June to July, 1970 and 1971 by J. A. Honey in the San Gabriel Mountains, Los Angeles County, California.

TINODES POWELLI Denning

New records from southern California are available. Riverside County: near Palm Desert, 26 June 1970, 23 July 1969, Saul Frommer; Aqua Caliente Indian Reservation, 24 February 1970, P. H. Arnaud; Los Ninas Ranch, Murrieta Road, 18 July 1971, J. A. Honey; San Diego County: Scissors Crossing, 7 October 1971, J. A. Honey; Orange County: Holy Jim Creek, 25 April 1970, J. A. Honey. Utah: Washington County, Leeds Canyon, July 1967, W. J. Hanson. The species is now known to occur from Baja California to Utah.

TINODES SISKIYOU Denning

Described from Jackson County, Oregon, it has now been collected in Wallowa County, Oregon, 1 July 1967, Kenneth Goeden. California records are now available: Mendocino County, 9 March 1968, J. R. Helfer; Sonoma County, 17 June 1972, D. G. Denning, along a heavily shaded shallow cool water creek; Lake County, Big Canyon Creek, June 17 and October 21, 1972, Paul Peterson.

TINODES CASCADIA Denning

Known only from Oregon. A new Oregon locality is: Douglas County, Oregon, 13 miles East Reedsport, collected resting on a wet seepage cliff, 1 June 1966, J. D. Vertrees and Joe Schuh.

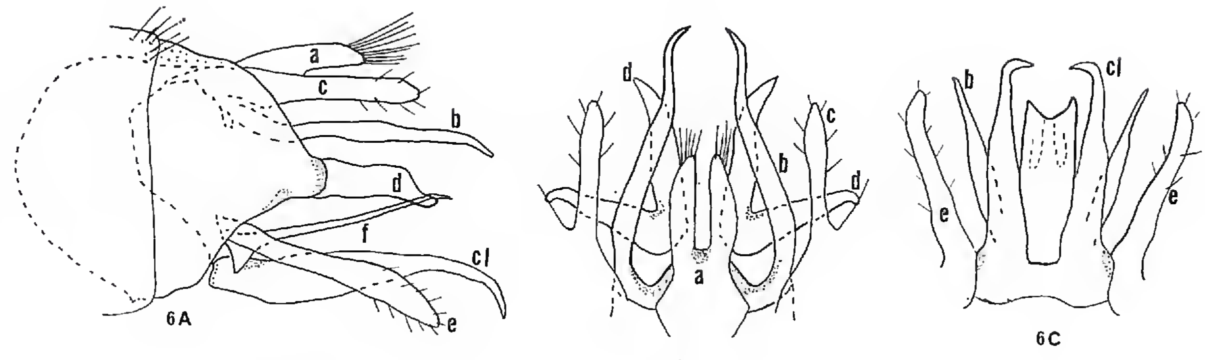
TINODES BELISA Denning

Known from Oregon south to Butte, Lake and Sonoma County, California.

HYDROPSYCHIDAE

Hydropsyche cora Denning, new species

This new species is related to *H. venada* Ross. It is easily discernible from other Hydropsyche in the configuration of the tenth tergum, the position of the spur associated with the membraneous dorsolateral process of the aedeagus, the dorsal plates and the short, thick peculiar profile of the aedeagus.



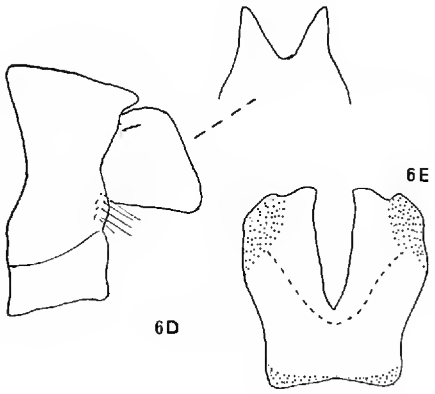


FIG 6 FARULA PETERSONI

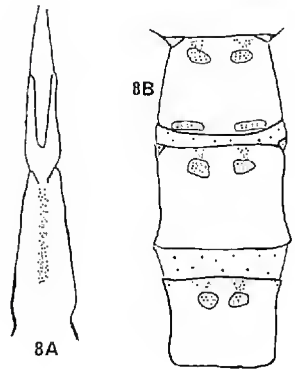


FIG 8 FARULA HONEYI

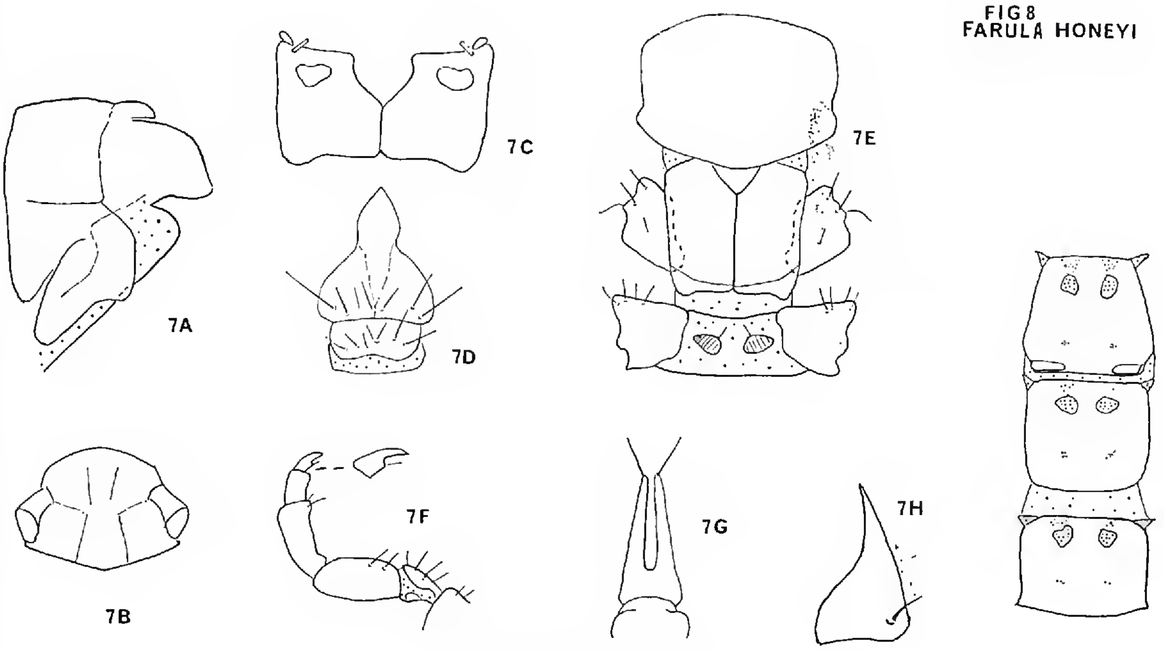


FIG 7 FARULA MALKINI

FIG. 6. *Farula petersoni* Denning, male and female genitalia. 6A, lateral view of male genitalia. 6B, dorsal view of male genitalia. 6C, ventral view of claspers. 6D, female genitalia, lateral view. 6E, spermatheca, ventral view. FIG. 7. *Farula malkini* Ross. 7A, female genitalia, lateral view. 7B, spermatheca, ventral view. 7C, head of larva, dorsal view. 7D, larval labrum. 7E, larval prothorax, mesothorax and metathorax, dorsal view. 7F, foreleg of larva. 7G, pupa, apex of abdomen. 7H, pupal mandible. 7I, sixth, seventh, eighth tergite of pupa, showing mesal plates. FIG. 8. *Farula honeyi* Denning, pupa, 8A, apex of abdomen, dorsal view. 8B, abdominal segments, six, seven and eight, dorsal view.

Male.—Length 7.5 mm. Wings dark gray, head, thorax and antennae dark brown, legs yellowish. Genitalia as in Fig. 3. Ninth segment annular, lateral projection ovate, tergum directed caudad. Tenth tergum with distinct dorsal angulation; from dorsal aspect, Fig. 3B, apex divided into pair of short subacute processes, slightly convergent. Clasper apical segment short, digitate, slightly narrowed from basal segment. Aedeagus, Fig. 3C, with base at right angle to ninth segment, basal half large and irregular, distal portion considerably narrowed; apex divided into dorsal and ventral branches with small membraneous area in between bearing minute extrusible spines; dorsomesal membraneous area bearing pair of short black acute spines near base (Fig. 3D) and ovoid dorsal plates (Fig. 3E) appear dorsad to apex.

Holotype male, Valley Forge Canyon, San Gabriel Mountains, Los Angeles County, California, 26 May 1971, J. A. Honey. Type to be deposited in the Entomology collection, Los Angeles County Museum of Natural History, Exposition Park, Los Angeles, California.

LIMNEPHILIDAE

FARULA Milne

The genus *Farula* is known only from Washington, Oregon and California. There are seven species ascribed to the genus, including the two new species described here. Members of the genus are seldom collected and are rare in collections. Previous to the collection of the new species *F. honeyi*, and *F. petersoni*, all members of the genus were known only from Washington and Oregon. *Farula* species are generally collected in cool high humidity areas from relatively low elevations to 5,000 feet. One new species described here is from southern California and represents a great extension southward of this interesting genus. To be consistent with described species the same lettering system is used as that employed by Ross (1950) in describing the complicated male genitalia.

Farula honeyi Denning, new species

Male.—Length 6 mm. Wings dark gray, densely setose; head, thorax, femora blackish, antennae and legs brownish, covered with dense dark setae. Maxillary palpi porrect, slightly shorter than labial palpi, third segment slightly longer than second, light yellowish. Head between antennae and palpi with thick yellowish setae. Genitalia as in Fig. 4. Dorsal lobe of ninth tergite, process "a", slender and undulating in lateral aspect, distal half bifurcated, slender, subacute (Fig. 4A) entire structure slightly sclerotized, difficult to discern. Process "b", (probable ventral lobe of ninth tergite), long, slender, arcuate from lateral aspect, apex flattened, acute; from dorsal view (Fig. 4A) distal portion widened and convergent. Cercus "c", slender, digitate, directed dorsocaudad. Process "d", (probable tenth tergite), directed ventrocaudad, lateral branch barely discernible from lateral view; from dorsal view (Fig. 4A) bifid distally, apices divergent, mesolateral arm projected laterad, short and stocky; transparent membraneous sheath extends

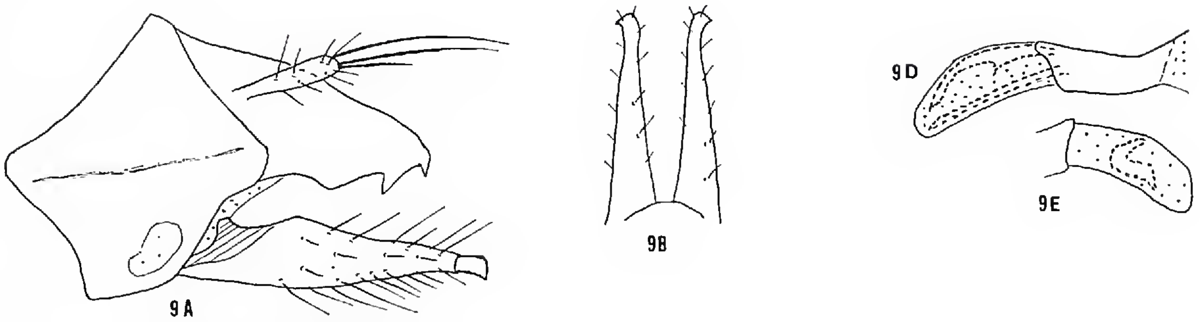
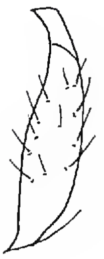


FIG9 PARTHINA VIERRA



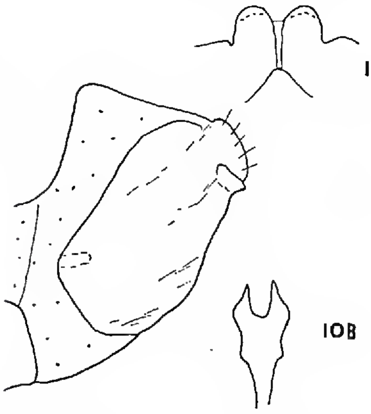


FIG 10 PARTHINA VIERRA

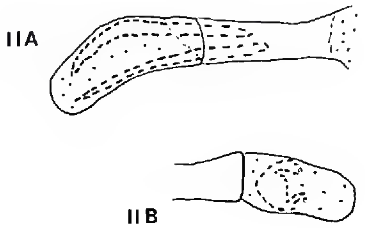


FIG 11 PARTHINA LINEA

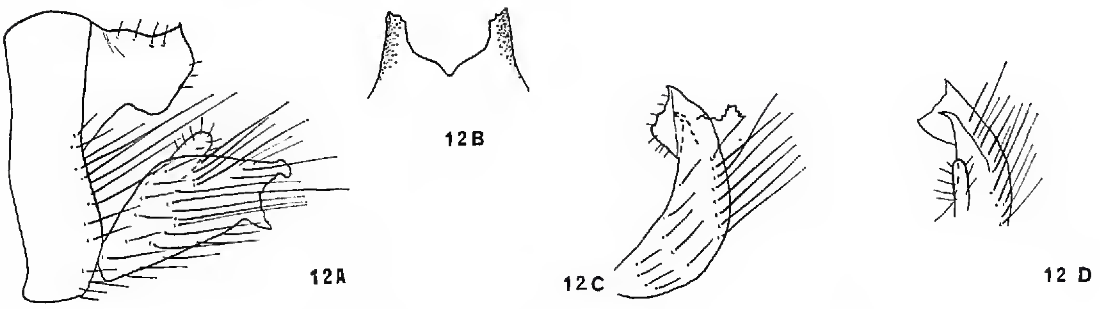


FIG12 LEPIDOSTOMA LACINATUM

Fig. 9. *Parthina vierra* Denning, male genitalia. 9A, male genitalia, lateral view. 9B, tenth tergite, dorsal view. 9C, clasper, ventral view. 9D, aedeagus, right lateral view showing internal dorsal rod, and the slender ventral rod. 9E, aedeagus, left lateral view, showing internal bifid sclerotized structure. Fig. 10, female genitalia, lateral view. 10A, eleventh tergum, dorsal view. 10B, spermatheca, ventral view. Fig. 11. *Parthina linea* Denning. 11A, aedeagus, right lateral view, showing the dorsal and ventral internal rods. 11B, left lateral view, bifid internal structure. Fig. 12. *Lepidostoma lacinatum* Flint. 12A, male genitalia, lateral aspect. 12B, dorsal view, tenth tergite. 12C, clasper, caudoventral view. 12D, clasper apex, mesodorsal view.

from apex of lateral arm to cercus and margin of ninth segment. Claspers, "cl", heavily sclerotized, tapered to dorsad curved acute apex; from ventral aspect (Fig. 4B) claspers widely separated, acute, directed caudad; process "e" originates near base, best discernible from ventral aspect, digitate, lightly sclerotized, setose, homology unknown. Aedeagus "ae", semimembraneous, difficult to discern except from lateral aspect (Fig. 4) slender throughout, apex abruptly curved ventrad.

FEMALE.—Length 6 mm. Similar to male in general structure and color. Tenth tergite narrow and elongate, division between tenth and eleventh tergite obscure (Fig. 5) eleventh tergite declivent, apex nearly truncate, from dorsal aspect (Fig. 5A) bifid. Spermatheca (Fig. 5B) occupying most of ninth and tenth sternites, mesal aperture long, narrow. Fifth sternite cephalid corner developed into obtuse process and invaginated small clear, elongate area (Fig. 5C).

PUPA.—Length 5 mm. General structure similar to that of *F. malkini* (Fig. 8A). Apex of mandibles acute, slender, no serrations. As in *F. malkini* labrum bears six long black setae. Apex of abdomen and mesal plates of tergites six, seven and eight, almost identical to *F. malkini* (Fig. 8B).

Holotype male, SAN GABRIEL MOUNTAINS, VALLEY FORGE CANYON, LOS ANGELES COUNTY, CALIFORNIA, 26 May 1971, J. A. Honey. Allotype, same data as for holotype. Paratypes, 13 males, 8 females, same data as for holotype; 1 male, Angeles Crest Highway, San Gabriel Mountains, Los Angeles County, California, 2 June 1970, J. A. Honey. Holotype, allotype and 2 male and 2 female paratypes deposited in Entomology Collection, Los Angeles County Museum of Natural History, Los Angeles, California.

I take pleasure in naming this *Farula* in honor of the collector, J. A. Honey, who has collected many very interesting Trichoptera. The collection site consisted of "a very small trickle of water running down almost verticle rocks" at an altitude of 4,800 feet. Valley Forge Canyon is "a small, very steep canyon," the stream forms "many small falls and pools," in the summer "it is reduced to a trickle."

Farula petersoni Denning, new species

This species is related to *F. malkini*, but in many details of the male genitalia it differs greatly from that species.

MALE.—Length 6 mm. Wings gray, pubescence sparse. Basal segment of antenna whitish except for mesal brown stripe entire length. Labium also whitish. Maxillary palpi porrect, whitish, pubescence dark and quite heavy. Pronotum with two pairs of semicircular white areas; mesoscutellum whitish, remainder black. Genitalia as in Fig. 6. Dorsal lobe of ninth tergum, process "a" (Fig. 6A) lightly sclerotized, digitate, apex oblique and bearing dense fringe of long brownish setae in lateral aspect; from dorsal aspect (Fig. 6B) bifurcated from base, each lateral lobe slender, directed caudad. Process "b", sinuate in lateral aspect (Fig. 6A) acuminate, apex acute and curved ventrad; viewed dorsally rod-like structures acute, curved laterad then mesad, gradually convergent (Fig. 6B). Cercus "c", long, slender, about same width throughout, setae sparse. Process "d", stout, heavily sclerotized, directed caudad beyond cerci, dark subacute apex curved laterad; basolateral branch barely discernible; from dorsal aspect (Fig. 6B) basal branch directed caudolaterad, apex attached to lightly sclerotized and pigmented sheath dorsad to cercus and ninth tergum, apices of mesal branches acute and divergent. Claspers "cl", considerably narrowed distally, apex acute, curved sharply ventrad; from ventral aspect (Fig. 6C) directed caudad, apices acute, curved strongly mesad; process "e" originates near base, digitate, slender, apex subacute, directed caudoventrad; filamentous branch "f" (Fig. 6A) arise from base and extend caudad slightly beyond process "d". Aedeagal shield lightly sclerotized, trough-like, apical emargination rounded from ventral aspect (Fig. 6C).

FEMALE.—Practically identical to male in size, wing pubescence and general coloration. Genitalia as in Fig. 6D. Tenth segment annular, division between it and eleventh tergum obscure. Eleventh tergum declivant, ventrocaudal apex rounded, apex bifid from dorsal aspect. Spermatheca (Fig. 6E) occupy portion of ninth and most of tenth sternites; mesal aperture wide, elongate.

Holotype male, UNNAMED CREEK ONE MILE NW TRINIDAD, HUMBOLDT COUNTY, CALIFORNIA, 1 May 1972, elevation 50 feet, Paul A. Peterson. Allotype female, same data as for holotype, except 3 June 1971. Paratypes 3 males, 2 females, same data as for allotype.

This species is named in honor of the collector, Paul A. Peterson, who collected the species from a small creek "about 3 feet wide and 1 foot deep, with a rocky, moss-covered bottom and scattered gravel-filled pools." "The creek ends abruptly in a 30 foot waterfall emptying into the Pacific Ocean."

FARULA RAINIERI Milne

Until recently known from 1 male collected at Mt. Rainier, Washington. Schmid, 1968 recorded the species from Chinook Pass, Washington, Skagit County, Washington and Marion County, Oregon. On 15 June 1969, R. W. Baumann collected 1 male at a creek at Christmas Falls, Mt. Rainier, Washington.

FARULA MALKINI Ross

Previously known from 2 males collected in Benton County, Oregon, it was recently recorded in large numbers from Oak Creek in Benton County by Anderson and Wold. The species was collected in emergence traps in April and May. Here recorded from Douglas County, Oregon, 18 miles east of Reedsport, Loon Creek Road, 27 May 1964, 3 males, 2 females, and on 1 June 1966, 1 male, 2 females, J. D. Vertrees and Joe Schuh. Adults, larval and pupal cases collected from a wet seepage cliff. Cases collected when few mature larvae or pupae were present, the majority of cases contained dead and disintegrating larvae and pupae.

FEMALE.—Similar to male in color and size. Genitalia as in Fig. 7A. From lateral aspect tenth segment annular; eleventh tergum obtuse, declivent; from dorsal aspect, lateral apices widely cleft, subacute; bursa copulatrix triangular, mesal aperture narrow, long (Fig. 7B).

Larva.—Head uniformly dark brown except for irregular cleared eye area, near apical corner inconspicuous slender antenna (Fig. 7C) epicranial suture distinct, from dorsal aspect (Fig. 7D); labrum with row of several short setae. Prothorax with no trace of a transverse furrow; dark brown, completely and heavily sclerotized, distinct mesal fracture; mesothorax completely sclerotized, light brown, distinct mesal fracture, apical margin with mesal emargination; metathorax with pair of brown sclerotized irregular-shaped lateral plates and pair of oval semimembraneous grayish areas bearing three minute setae (Fig. 7E). Forelegs (Fig. 7F) with femora widened, apical margin short, only slightly longer than tibia. Based on one partially intact larva, remainder too decomposed for description.

Pupa.—Apex of abdomen (Fig. 7G) with long, finger-like lobes, narrowed distally, largely devoid of setae. Mandibles acute (Fig. 7H) no serrations; labrum with group of six long dark setae. Sixth, seventh and eighth tergites with mesal plates (Fig. 7I); sixth tergite with pair of irregular oval plates near apical margin and pair of narrow elongate plates at posterior corner; seventh and eighth tergites with pair of irregular oval plates near anterior margin, each bearing several minute hooks; abdomen without lateral fringe of hair.

Case.—Case of mature larva and pupa 5–6 mm long, cylindrical and slightly curved, tapering gradually from 0.5 mm to almost 1 mm in diameter. Constructed of minute sand grains, all similar in size and cemented together to form smooth exterior.

ODONTOCERIDAE

Parthina vierra Denning, new species

The genus has been represented by a single species, *P. linae*. This second species may be recognized by the configuration of the tenth tergite, the short apical segment of the clasper and the internal processes of the aedeagus.

Male.—Length 7.5 mm. General color dark brown, wings densely setose, reflexed fold of the subcostal cell of forewing filled with intermixture of dark and light colored scales; head and thorax dark brown, mesoscutellum whitish, setose sparse; maxillary and labial palpi light brown, setose; tibial spurs densely covered with short brown setae. Genitalia as in Fig. 9. Ninth segment widest laterally with obtuse cephalad and short truncate distal projections, dark line extends through segment, tergum considerably narrowed, distinct semicircular clear area near sternum (Fig. 9A). Tenth tergite composed of pair of lateral convex plates, distal corner deeply emarginate, resultant acute prongs directed ventrad; from dorsal aspect (Fig. 9B) lateral plates widely separated, apex obliquely truncate, slightly divergent. Cerci digitate, bearing several very long setae. Clasper basal segment long, cylindrical, gradually tapered distally, basal portion characteristically darkened; apical segment short, truncate (Fig. 9A); from ventral aspect (Fig. 9C) apical segment acute, curved mesad. Basal portion aedeagus sclerotized, distal portion semimembraneous; from left lateral aspect (Fig. 9E) internal bifid, light brown sclerotized structure discernible; from right lateral aspect (Fig. 9D) internal dorsal rod present, distally acuminate and sharply curved ventrad, near base acute ventral angulation present, located ventrad long, slender, acuminate rod reaches almost to apex; aedeagus slightly longer than combined ninth segment and claspers.

FEMALE.—Genitalia as in Fig. 10. General appearance similar to male except absence of scales on forewings. Tenth segment large, oval, light brown sclerotized; eleventh tergum lightly sclerotized, from dorsal aspect (Fig. 10A) narrowly separated on meson, apex rounded; bursa copulatrix (Fig. 10B) long and narrow.

Holotype male, UVAS CREEK, UVAS CANYON, SANTA CLARA COUNTY, CALIFORNIA, 3 July 1971, D. G. Denning; allotype, same data as for holotype; paratypes, 4 males, 3 females, same data as for holotype.

PARTHINA LINEA Denning

In the original description the internal structures of the aedeagus were not figured. When viewed from the left lateral aspect, Fig. 11B, the internal structure divided into a dorsal process widened distally, and an acute short ventral process, from right lateral aspect, Fig. 11A, dorsal rod acuminate and curved slightly ventrad, ventral rod long, slender, acuminate.

Parthina linea was described from specimens collected in Tuolumne County, California, and from near McMinnville, Oregon. Additional records are: 27 males, 6 females west of Selma, Josephine County, Oregon, 6 May 1964, Joe Schuh; 10 males, 1 female Macalester Wash near Martinez, Yuma County, Arizona, 30 March 1961, C. A. Toschi Tauber; this water is backed up from the Colorado River and contains numerous cattails and algae; 1 male Santa Clara County, California, 1 June 1960, S. D. Smith.

LEPIDOSTOMATIDAE

LEPIDOSTOMA LACINATUM Flint

This species has not been recorded since it was described from Durango and Sinaloa, Mexico by Flint, 1967. The collection in Arizona represents an extension northward of about 700 miles. One male collected at Miller Canyon, Huachuca Mts., Santa Cruz County, Arizona, 17 August 1971, 7,000 feet, J. A. Honey.

The Arizona specimen suggests the species may be quite variable (Fig. 12). Major differences are: the short, robust tenth tergite, apices truncate, not distally narrowed (Fig. 12A) from dorsal aspect (Fig. 12B) apices widely separated; aedeagal prongs only slightly convergent; apex of apicodorsal lobe of clasper curved ventrad, lateral surface with a dense mat of long yellowish setae which obscures details of the structure, from caudoventral aspect (Fig. 12C) apex acute; from mesodorsal aspect (Fig. 12D) the acute hooked ventral arm of the mesodorsal process reaches almost to margin.

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BOOK REVIEW

The Moths of America North of Mexico. Fascicle 21, Sphingoidea. Ronald W. Hodges. E. W. Classey Ltd. and R. B. D. Publications, Inc. 158 p., 14 color plates, 19 figs., xii. 1971. $24 (subscription price $19.60). North American Distributor: Entomological Reprint Specialists.

This is the first to be published in a projected series of 41 Fascicles treating "The Moths of America North of Mexico." The concept of covering the more than 10,000 species with color illustrations of all species and their major color forms is truly a monumental one. The present fascicle on the Sphingoidea provides an excellent advertisement for the high quality of the series. The heavy paper, large clear print, beautifully reproduced life size color illustrations, and excellent line drawings are a credit to all involved with the production of this fascicle. A brief history of the project with photos of those involved appears in an introductory section.

Keys to 40 genera and 115 species of adults and partial keys to genera based on pupae and mature larvae are presented. Species treatments vary in completeness. They include synonymies, adult and larval diagnoses, geographic and seasonal distributions, food plants and habits. Infraspecific variation is discussed and often illustrated, but subspecies are not treated as such. Text figures of genitalia are provided for representatives of most genera. A few name changes are apparent even to the non-lepidopterist. *Celerio and Protoparce* are treated as synonyms of *Hyles* and *Manduca* respectively.

The 14 plates containing 199 color photos are followed by two plates of excellent, clearly labelled structural drawings by the author's wife. The fascicle concludes with indices to animal and to plant names.

The cost of the series seems a bit high for the average entomologist, but the quality of the publication and the impressive color plates make it a worthwhile investment for dedicated lepidopterists and a manditory reference for all institutions.—Robbin W. Thorp, *University of California, Davis, 95616.*